

November 1997

# APACHE LONGBOW HELICOPTER

## Fire Control Radar Not Ready for Multiyear Procurement



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National Security and  
International Affairs Division

B-276448

November 17, 1997

The Honorable William S. Cohen  
The Secretary of Defense

Dear Mr. Secretary:

The Army plans to award a multiyear contract for the Apache Longbow helicopter's fire control radar in December 1997. We reviewed the Apache Longbow program to determine if the fire control radar design is stable and ready for multiyear contract award.

Apache Longbow  
Helicopter  
Fire Control Radar  
Not Ready for  
Multiyear  
Procurement

## Background

The Longbow is a modification of the Apache helicopter that consists of an upgraded airframe, a newly developed radar, and the Longbow Hellfire missile. The Apache Longbow is designed to conduct precision attacks in adverse weather conditions, automatically engage multiple targets, provide fire-and-forget missile capability, and operate on the digital battlefield of the future. The radar, the key component of the Longbow, is designed to provide the helicopter with the capability to automatically detect, classify, and prioritize targets.

In 1991, the Army planned to develop and procure 227 Longbow Apache helicopters. In May 1993, the program was restructured to upgrade the entire fleet of 758 helicopters to the Apache Longbow configuration but outfit only 227 with the fire control radar and a more powerful 701C engine. Full-rate production of both the Apache Longbow airframe and fire control radar was authorized in October 1995. The first contract for 10 fire control radars (lot 1) was awarded in March 1996, and the second contract was finalized in January 1997 for an additional 11 radars (lot 2). The Army plans to award a multiyear contract for the fire control radar in December 1997.

## Results in Brief

Under 10 U.S.C. 2306b, before awarding a multiyear contract, the design of the system should be stable. The radar's transmitter, a critical component, is being redesigned. Additionally, DOD regulations require that qualification test and evaluation be completed prior to the full-rate production decision. The original transmitter may not complete qualification testing and the redesigned transmitter's performance will not be demonstrated before the contract is awarded. In our January 1997 letter to you, we expressed our concern about the stability of the transmitter's design and concluded that

the radar would not be ready for the planned multiyear procurement.<sup>1</sup> Our review confirmed this conclusion; however, the Army still plans to proceed with the multiyear contract. Award of the multiyear contract should be delayed until all statutory and regulatory requirements are met.

## Multiyear Contract for Fire Control Radar Is Inappropriate, as Planned

The fire control radar's transmitter has had development problems, and parts will not be available for a full production run of the original transmitter; therefore, it is being redesigned. However, the contractor has experienced delays in redesigning the radar's transmitter and, consequently, does not yet have a prototype. As a result, the actual design of the radar's transmitter is not stable, and its performance will not be known when the scheduled multiyear contract is awarded. Since the design of the radar is not yet stable, multiyear contract approval will occur without meeting the statutory requirement.

In our January 1997 letter, we expressed concerns about the performance of the Apache Longbow's fire control radar, particularly the transmitter. We noted that (1) the transmitter was being redesigned, (2) the lot 2 contract unit production costs had doubled from the original estimate, and (3) the lack of a stable radar design could increase logistics support costs due to two differently configured transmitters. We asked whether the contract for the lot 2 fire control radar contract would be delayed and, if not, what actions would the Department of Defense (DOD) take to ensure that our concerns were resolved before awarding the contract. DOD responded that it did not direct the Army to delay the award of the lot 2 contract because it believed that current program management oversight, combined with the Integrated Product Team process, was adequate to address all of our concerns.

According to the Apache Longbow project manager, while the radar was approved for full-rate production in October 1995, it was apparent to the program office that it would need time to resolve problems with the radar's design. As we noted in our January 1997 letter, some of the radar transmitter's electrical components, such as diodes and amplifiers, did not perform well in cold temperatures. In addition, to achieve the required output, the current transmitter must undergo time-consuming and costly manual integration efforts. Also, suppliers informed the fire control radar's manufacturer in 1995 that they would no longer provide critical transmitter components. To improve performance and address parts availability and cost problems, the Army determined in November 1995

<sup>1</sup>Apache Longbow Fire Control Radar (GAO/NSIAD-97-97R, Jan. 27, 1997).

that the radar's transmitter had to be redesigned. The program office has now scheduled the radar's full-rate production to occur with award of the multiyear contract.

DOD regulations require that qualification test and evaluation be completed prior to the full-rate production decision. Qualification tests require that a system satisfactorily demonstrate performance as specified in the production contract. As early as 1993, the Army realized the program contained a high degree of production risk because of the possible need to redesign and requalify the fire control radar's components. The Army acknowledged that this concern would not be completely resolved until all qualification tests were completed. However, the original transmitter may not complete qualification testing prior to the multiyear contract award, and the redesigned transmitter is not scheduled for qualification tests until December 1998, over 3 years after full-rate production of the radar was authorized. According to contractor officials, this performance demonstration could be delayed until early 1999.

The contractor has experienced delays in developing the radar's redesigned transmitter and, therefore, does not yet have a prototype. Because a prototype of the redesigned transmitter was not ready, bench testing scheduled for March and then June 1997 did not occur. In addition, the redesigned transmitter will not be available for the government's first article test,<sup>2</sup> scheduled to begin in March 1998; therefore, the Army plans to use the original transmitter for these tests. Because approximately 85 percent of the fire control radars will be equipped with the redesigned transmitter, first article test results using the original transmitter will not provide an adequate basis for assessing the radar's performance. Although the current transmitter does not include the fixes from the redesign, the Army still plans to use it in the event further delays occur in the development and testing of the redesigned transmitter.

## Recommendation

Because the redesigned transmitter will be used in approximately 85 percent of the Apache Longbow's fire control radars, we recommend that the Secretary of Defense direct the Secretary of the Army to delay the award of the multiyear contract until the radar has successfully passed testing as required by the regulations and the design is stable as required by 10 U.S.C. 2306(b).

<sup>2</sup>First article testing comprises preproduction and initial production tests to ensure that the contractor can furnish a product that meets the established technical criteria.

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## Agency Comments and Our Evaluation

In commenting on a draft of this report, DOD nonconcurred with our recommendation. DOD informed us that the Army plans to test a prototype of the redesigned transmitter in November and December 1997 to verify the compatibility and functionality of the transmitter with other components of the radar and that lot acceptance testing will be completed in December 1998. According to DOD, this test and evaluation approach and the projected \$80 million savings from the multiyear contract are in the best interest of the government. DOD noted that the transmitter represents only 2 percent of the fire control radar's total parts and does not jeopardize the design stability of the fire control radar or the Longbow Apache weapon system. Further, DOD stated that we are incorrect in asserting that the Army has not met the statutory requirement for a stable design prior to multiyear contract approval. According to DOD officials, the redesign effort is only a procedure to requalify an out-of-production part.

It now appears that DOD will delay award of the multiyear contract. According to DOD officials, the contract that was originally scheduled to be awarded in November 1997 will now be awarded after completion of the functionality testing in December 1997. However, the Army's plan does not satisfy the lot 2 contract and regulatory requirements for testing. The lot 2 fire control radar production contract specifically requires qualification testing of the redesigned transmitter. As we noted in the report, qualification and first article testing validate that a component can operate in an integrated system environment. However, neither DOD's planned November-December testing nor its planned first article test will achieve these purposes. The first time that the redesigned transmitter will be tested in a system environment is during the December 1998 qualification tests.

We are not persuaded by DOD's assertion regarding the significance of the transmitter to the design stability of the radar or Apache Longbow weapon system. Although the transmitter represents only 2 percent of the part count for the radar, proper functioning of the transmitter is critical to the performance of the weapon system. The transmitter is the critical component of the radar, which is the single critical distinction between the Apache Longbow and the original Apache helicopter. If the transmitter does not work, the fire control radar will not provide the helicopter with the capability to automatically detect, classify, and prioritize targets in adverse weather conditions.

Also, we do not agree that this effort is only a procedure to requalify an out-of-production part. The original transmitter has not completed and

may not complete full qualification testing prior to award of the contract. In addition, the redesigned transmitter has not and will not be subjected to qualification testing until 1 year after the multiyear contract award. It is only through qualification testing that the Army can be assured that the redesigned transmitter performs as required in an integrated system environment. Therefore, we continue to believe that the multiyear contract should be delayed until the radar has successfully passed first article and qualification tests with the redesigned transmitter. DOD's detailed comments are reprinted in appendix I.

## Scope and Methodology

To determine whether the Apache Longbow fire control radar design was stable and whether it was ready for multiyear contract award originally scheduled for November 1997, we reviewed various program documents related to the development and acquisition of the Apache Longbow fire control radar. We interviewed cognizant officials at the Program Office for Aviation; the Apache Attack Helicopter Project Management Office; and the Office of the Executive Director, Aviation Research, Development, and Engineering Center, at the Army's Aviation and Troop Command, St. Louis, Missouri; the Office of the Secretary of the Army for Research, Development, and Acquisition, Washington, D.C.; and the U.S. Army Office of the Deputy Chief of Staff for Operations and Plans, Washington, D.C. We also interviewed officials from Lockheed Martin, Longbow Limited Liability Company, and Northrop Grumman, manufacturers of the fire control radar, in Orlando, Florida. In addition, we obtained documentation from the Defense Contract Management Command located at McDonnell Douglas Helicopter Systems, Mesa, Arizona.

To determine whether Apache Longbow fire control radar performance requirements would be met and operational capabilities demonstrated, we reviewed relevant Army, contractor, and DOD documents. These included the Defense Acquisition Executive Summaries, contractor's Fire Control Radar Program Progress Review, and the Apache Longbow's Operational Requirements Document. We also discussed performance and capability requirements with cognizant Army officials in St. Louis, Missouri, and Washington, D.C.

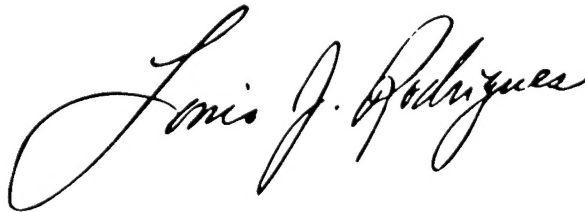
We conducted our review from February through August 1997 in accordance with generally accepted government auditing standards.

As you know, the head of a federal agency is required by 31 U.S.C. 720 to submit a written statement of actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Reform and Oversight not later than 60 days after the date of this report. A written statement also must be submitted to the Senate and House Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the Chairmen and Ranking Minority Members, Senate and House Committees on Appropriations, Senate Committee on Armed Services, Senate Committee on Governmental Affairs, House Committee on National Security, and House Committee on Government Reform and Oversight; the Secretary of the Army; and the Director, Office of Management and Budget. We will also provide copies to others upon request.

Please contact me at (202) 512-4841 if you or your staff have any questions concerning this report. Major contributors to this report were Robert J. Stolba, Charles Burgess, Richard Burrell, and Nora Landgraf.

Sincerely yours,

A handwritten signature in cursive script, reading "Louis J. Rodrigues". The signature is written in dark ink and is positioned above the printed name and title.

Louis J. Rodrigues  
Director, Defense Acquisitions Issues





# Comments From the Department of Defense



ACQUISITION AND  
TECHNOLOGY

## OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON  
WASHINGTON DC 20301-3000

21 OCT 1997

Mr. Louis J. Rodrigues  
Director, Defense Acquisitions Issues  
National Security and International  
Affairs Division  
U.S. General Accounting Office  
Washington, D.C. 20548

Dear Mr. Rodrigues:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "APACHE LONGBOW HELICOPTER: Fire Control Radar Not Ready for Multi-Year Procurement" dated October 1997 (GAO/NSIAD-98-11/OSD Case 1472). DoD non-concurs with the GAO recommendation.

The GAO stated that "... (1) the radar's design was still changing and was to be replaced with a new design, (2) the lot 2 contract unit production costs had doubled from the original estimate, and (3) the lack of a stable radar design could increase logistics support costs due to two differently configured transmitters." The GAO concludes that a multi-year contract for the fire control radar beginning in FY 1998 is inappropriate until the Army completes development of the radar transmitter's design and tests it to demonstrate its performance. It recommends that the multi-year contract be delayed until such testing is completed.

Since a subcontractor decided not to build a military-specific transmitter subcomponent, the Army decided to upgrade the transmitter with a newly-developed substitute [subcomponent]. This enhanced design is simplified, will be more producible and supportable (since it will now be manufactured substantially in-house with readily available components), will enhance reliability, and will reduce life-cycle cost.

The first two lots of fire control radars were procured using the design configuration that was evaluated during IOT&E in January to March 1995 to support full-rate production approval for the airframe and fire control radar in October 1995. Lot 1 unit costs were \$7.725 million, Lot 2 unit costs are \$4.95 million, and anticipated average unit cost is estimated to be \$2.5 million over the course of the multi-year. By not pursuing a multi-year beginning in FY 1998, the Department will forgo savings of approximately \$80 million over the course of the multi-year.

The GAO's basis for its recommendation is the multi-year statute requiring a stable design prior to proceeding. The enhanced transmitter, which represents approximately 2% of the total part count of the fire control radar, will meet or exceed all specifications of the original transmitter and will be completely interchangeable with the older unit, eliminating any need for retrofit. Testing of the prototype of the new transmitter will be conducted on a functioning Longbow fire control radar in November-December 1997 to verify interchangeability and full



**Appendix I**  
**Comments From the Department of Defense**

compliance with all specifications. Final fire control radar lot acceptance testing will be completed in December 1998. This is a generally accepted, low-risk, prudent course of action to qualify out-of-production parts. The test and evaluation approach would be the same even if the Department were to proceed with a single-year contract in FY 1998.

Re-designing a component that represents only 2% of the part count does not jeopardize the design stability of the entire fire control radar or the entire Longbow Apache weapons system. GAO's interpretation that the multi-year statute's stable design provision is not met for an out-of-production part is not warranted in this case. The test and evaluation approach and projected savings of \$80 million are in the best interest of the government.

DoD appreciates the opportunity to comment on the draft report.



George R. Schneider  
Director  
Strategic and Tactical Systems